Polymer-dispersed liquid crystals (PDLCs) are used in numerous applications including smart windows, displays, micro-lenses, lasers, and data storage due to their excellent electro-optical properties. Besides electrical and optical driving, LC re-alignment based on the acousto-optic effect has also been demonstrated, where acoustic waves change the optical axis, thus changing the transmitted light intensity. MRSEC researchers have demonstrated that surface acoustic waves (SAW) can induce strong acoustic streaming inside the LC droplets encapsulated in the PDLC film, which efficiently re-aligns the LC molecules and changes the transparency of the film. Such a SAW-driven PDLC light shutter can be fabricated simply by integrating a cured PDLC film and a pair of interdigital transducers (IDTs) onto a piezoelectric substrate. With further developments, the SAW-based driving scheme could have significant impact on future PDLC-based nanophotonic and plasmonic devices.

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